

CLAIMS

What is claimed is:

1. A cooling system in a portable computer for removing heat from a heat generating device, said heat removal system comprising:
 - a keyboard having a thermally conductive support plate, said support plate having a substantially planar bottom surface; and
 - a flat heat pipe attached to said bottom surface of said keyboard support plate, said heat generating device thermally coupled to said flat heat pipe.
2. The cooling system of claim 1 wherein said flat heat pipe comprises a plurality of micro-channels that are arranged parallel to one another.
3. The cooling system of claim 1 wherein said flat heat pipe substantially covers said bottom surface of said keyboard support plate.
4. The cooling system of claim 1 wherein said flat heat pipe covers a portion of said bottom surface of said keyboard support plate.
5. The cooling system of claim 1 further comprising air moving means for producing an air flow through an air moving means housing, at least a portion of said housing being thermally coupled to said flat heat pipe.
6. The cooling system of claim 5 wherein said air moving means comprises a fan.

7. The cooling system of claim 1 further comprising a fan for producing an air flow through a fan housing, said fan housing having at least one fin disposed in the path of said air flow, said heat pipe thermally coupled to said fin.

8. The cooling system of claim 5 further comprising a control circuit for switching said fan on or off in response to a temperature measurement on said keyboard.

9. The cooling system of claim 5 further comprising a control circuit for switching said fan on or off in response to a temperature measurement on said heat generating device

10. The cooling system of claim 5 further comprising:
a temperature sensing device attached to said keyboard; and
a controller for receiving a signal from said temperature sensing device,
said controller switching said fan on or off in response to said signal.

11. The cooling system of claim 5 further comprising:
a temperature sensing device attached to said heat generating device;
and
a controller for receiving a signal from said temperature sensing device,
said controller switching said fan on or off in response to said signal.

12. A heat removal system in a portable computer for removing heat

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from a heat generating device, said heat removal system comprising:

a keyboard having a thermally conductive support plate, said support plate having a substantially planar bottom surface;

a flat heat pipe attached to said bottom surface of said keyboard support plate, said heat generating device thermally coupled to said flat heat pipe; and

air moving means for producing an air flow through a housing, at least a portion of said housing being thermally coupled to said flat heat pipe.

13. The heat removal system of claim 12 wherein said flat heat pipe comprises a plurality of micro-channels that are arranged parallel to one another.

14. The heat removal system of claim 12 wherein said air moving means comprises a fan.

15. The heat removal system of claim 12 wherein said air moving means housing includes at least one fin disposed in the path of said air flow, said heat pipe thermally coupled to said fin.

16. The heat removal system of claim 12 further comprising a control circuit for switching said fan on or off in response to a temperature measurement on said keyboard.

17. The heat removal system of claim 12 further comprising a control circuit for switching said fan on or off in response to a temperature measurement of said heat generating device.

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18. The heat removal system of claim 12 further comprising:
a temperature sensing device attached to said keyboard; and
a controller for receiving a signal from said temperature sensing device,
said controller switching said fan on or off in response to said signal.

and

19. The heat removal system of claim 12 further comprising:
a temperature sensing device attached to said heat generating device;
a controller for receiving a signal from said temperature sensing device,
said controller switching said fan on or off in response to said signal.

20. A cooling system in a portable computer for removing heat from a
heat generating device, said heat removal system comprising:
a keyboard having a thermally conductive support plate, said support
plate having a substantially planar bottom surface;
a flat heat pipe attached to said bottom surface of said keyboard support
plate, said heat generating device thermally coupled to said flat heat pipe;
a fan for producing an air flow through a fan housing; and
a thermally conductive fin located within said air flow, said heat pipe
thermally coupled to said fin.

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21. The heat removal system of claim 20 further comprising:
a temperature sensing device attached to said keyboard; and
a controller for receiving a signal from said temperature sensing device,
said controller switching said fan on or off in response to said signal.

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22. The heat removal system of claim 20 further comprising:
a temperature sensing device attached to said heat generating device;

and

a controller for receiving a signal from said temperature sensing device,
said controller switching said fan on or off in response to said signal.

23. A cooling system in a portable computer for removing heat from a
heat generating device, said heat removal system comprising:

a keyboard having a thermally conductive support plate, said support
plate having a substantially planar bottom surface;

a flat heat pipe attached to said bottom surface of said keyboard support
plate, said heat generating device thermally coupled to said flat heat pipe;

a fan for producing an air flow through a fan housing;

a thermally conductive fin located within said air flow, said heat pipe
thermally coupled to said fin;

a temperature sensing device attached to said keyboard; and

a controller for receiving a signal from said temperature sensing device,
said controller switching said fan on or off in response to said signal.

24. A cooling system in a portable computer for removing heat from a
heat generating device, said heat removal system comprising:

a keyboard having a thermally conductive support plate, said support
plate having a substantially planar bottom surface;

a flat heat pipe attached to said bottom surface of said keyboard support
plate, said heat generating device thermally coupled to said flat heat pipe;

a fan for producing an air flow through a fan housing;
a thermally conductive fin located within said air flow, said heat pipe
thermally coupled to said fin;
a temperature sensing device attached to said heat generating device;
and
a controller for receiving a signal from said temperature sensing device,
said controller switching said fan on or off in response to said signal.

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